Spat Collection
Scallop 2000

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During the spring and summer scallop season of 2000, 50 spat bags were deployed to determine the best areas for spat collection in Nantucket Harbor. Spat bag lines are designed to suspend nylon bags filled with nylon mesh in the surface of the water column which provide habitat for larval scallops to settle out upon. Five areas in the harbor were sampled with spat lines containing 10 spat bags each. The Marine and Coastal Resources Department hoped to find an area most suitable for spat collection in the future. Also we hoped to find an area that would have the best environmental conditions to over winter scallop cages, and establish a spawning nursery for the spring of 2001.

Spat Bag Lines, shown in figure #1 were assembled during the week of 5/22/00 with scavenged materials from the Boat House at Brant Point and other materials purchased from Aquatic Ecosystems earlier that month. We began to collect and repair scallop cages in and around Nantucket Harbor that had been previously used for other experiments. During the week of 5/29/00 the Marine Dept. Staff deployed five lines at different points in the harbor, shown on map #1. These areas were selected based on common knowledge and research conducted in the past. New areas were also selected to cover as much of the harbor as possible.

During deployment we encountered the most problems with Line #1. The first site located off the North end of Brant Point was changed because the depth of the water and the speed of the current began to sink the buoys and tangle the lines to the bags. A second and third deployment was attempted at two sites in 1st Bend. However depth and current posed the same problem again. Line #1 was finally moved to the western tip of 2nd Point. Here the speed of the current did tangle the bag lines, but for the most part it did seem to be floating well and would work effectively. However after a storm the line came free of it's anchors and washed up on the West Side of Pocomo on the 28th of June. From there it was moved for the last time and taken to a spot near it's originally proposed location, by tying it off to the pier at the Boat House on Brant Point.

Lines #2, #3, #4, and #5 were also set that week, and met with far greater success. Line #2 was placed near the middle of 2nd Bend at about 150 yards off shore, and in about 10 feet of water. Line #3 was placed near the middle of 3rd Bend, similarly to Line #2. Line #4 was placed off the West Side of Bass Point (5th Point), about 50 yards off and in about 20 feet of water. One bag was lost off Line #4 when during deployment it became entangled on a boat cleat. Line #5 was placed on the East Side of Pocomo, about 200 yards off shore, and in about 20 feet of water.

These lines were checked regularly throughout the summer, with some necessary maintenance. As the summer season progressed, most of the lines and bags became fouled with plant and animal growth. Entanglement of lines and bags also occurred as a result too much line being placed between the main line and the bags. On 7/3/00 the first bag was checked for spat that would have floated in, attached itself, and started to grow out upon the nylon mesh. A bag from Line #5 was opened and it's contents examined. No spat was seen at this time, and due to windy conditions no other lines were checked.

Spawning occurs when the water temperature reaches 70 degrees, and it takes approximately 30 days after fertilization before the scallop spat will attach themselves to something to grow out upon. Harbor temperature did not rise to proper temperature for spawning until mid June, so we really did not expect to see any spat until late July. This speculation was confirmed when on 7/28/00 one bag from each line was opened, emptied, and its contents examined. Line #1 had seed 0.5cm in diameter, however only a half dozen were visible. Line #2 did not appear to have any seed at all, however there was an abundant population of Mud Snails, and 60-70 juvenile Green Crabs; which were removed at that time. Line #3 contained approximately one dozen-scallop seed 0.5 cm in diameter; also present were a large number of snails and juvenile crabs. Line #4 showed a larger volume of seed, with nearly three dozen present; and despite the deeper water just as many snails and crabs. Line #5, also in deeper water contained approximately 35 seed 0.5 cm in diameter; nearly identical to Line #4 it also had a great deal of crabs and snails. On the 11th of August another inspection of the lines was done, and this time two bags on each line were checked. Line#1 had very little seed, but they did appear to be maturing well. The seed in Lines #2 and #3 appeared to be maturing well ranging in size from 1.0 cm to 2.5 cm in diameter, with the average being 2.0 cm in diameter. The seed in Lines #4 and #5 were substantially smaller, though more numerous the average sizes was smaller being 1.0 cm in diameter with the largest at 1.5 cm.

On the 18th of August we returned to check some of the bags on the lines not yet examined. Similar results were found on all lines as previously observed, and each time the crabs were removed and the scallops counted. Lines #1, #2, and #3 had bags that contained approximately a dozen seed each. However Line#4 had bags containing 76 and 107 seed, and Line #5 had bags containing 67 and 71 seed. Observations made so far were that the lines in deeper water with a slower current collected more seed, but that the lines in shallow water with a higher rate of flow contained less seed that grew faster in size. Also noticed was that the large amounts juvenile Green Crabs did not seem to have an influence on the number of seed present, most likely their size made them ineffectual as predators. There were no empty shells present in any of the bags, and the number of crabs in each bag seemed relatively constant.

Totals collected from the Spat Lines are as follows: Line #1 collected 9/20/00 contained 139 Scallop seed, Line #5 collected 9/27 contained 608 seed, Line #4 collected 10/3 contained 539 seed, Line #3 collected 10/10 contained 208 seed, and Line #2 contained 141 seed. Lines #1, #3, #4, and #5 all lost 1 Spat Bag during the course of the summer. The average size of 50 scallops randomly taken out of Line #5 was 3.1cm in diameter. Also worthy of note is that there appears to have been three distinct ranges in size of seed, which may indicate three spawning events over the summer. The first set resulted in a size range upon collection of 3.5cm to 5.5cm in diameter. A second set, which may have occurred in mid summer resulted in a size range from 1.5 cm to 3.0 cm. The last spawning event, which would have occurred in early September, resulted in a third range of sizes from 0.3 cm to 1.0 cm. These three ranges may have been possible due to the high standard of environmental conditions observed during the summer of 2000. Water quality was good, with high levels of dissolved oxygen, good visibility, and high phytoplankton counts. Large quantities of diatoms would mean that there would be enough food available to ensure good reproductivity throughout the summer.

Spat collection for the summer of 2000 leaves us with more questions to be asked than answered, but we can make several conclusions from the areas tested. It would appear that the areas off Pocomo Point toward the Head of the Harbor are best for Spat collection. This is because the slower moving, and deeper water there resulted in a higher catch ratio than the shallower faster moving water in 2nd and 3rd Bend. The extremely fast current off Brant Point also resulted in fewer Spat settling, and being able to grow out. The conditions at Pocomo would also provide an excellent area for a nursery, because the slower moving water would allow a greater chance for fertilization during spawning, with fewer larvae being carried out into the sound. It also can be concluded that juvenile Green Crabs are not big enough to represent a significant threat to scallop seed, as no mortalities occurred in the bags.

Conclusions:

1. Pocomo Point sites 4 & 5, are best for spat collection.
2. Spat collection appears most successful in areas where the current is slow and the waster deep.
3. Pocomo area is conducive for a nursery, due to slow current and greater chance of fertilization.
4. Green crabs are not a significant threat to scallops in spat collection

Spat collection can be very successful, with very little effort, provided that proper environmental conditions are met. Scallop seed also grows better in natural conditions, as was seen by the 10% mortality rate that occurred when the spat collected were moved to the aquaculture facility at the Boat House before being dispersed into Nantucket Harbor. In order to gather more information on the unique effects of the harbor on Scallop maturation and development, further experimentation will continue throughout the winter and spring of 2001. This information will be reported on following the completion of these experiments, and in correlation with knowledge already acquired will give us a greater understanding of how to manage this fishery.